

to ochraceous-buff on muzzle and cheeks, and with a faint brownish wash along middle of back; underparts between buff and cream-buff, slightly darkened by the slaty under-colour, the line of demarcation along sides of body rather well defined; throat and median region of chest white to base of hairs; whiskers blackish; upper lip whitish buff except in region of muzzle; feet dull greyish buff; tail obscurely bicolor, similar to back above, though rather conspicuously darkened by a brownish suffusion through terminal third, light buffy below, though not so pale as belly.

Skull and teeth.—The skull resembles that of *Muscardinus avellanarius*, except that the audital bullæ are circular in outline and much smaller, owing chiefly to the absence of the inflated region between paroccipital process and bullæ proper. This inflation is always present in *M. avellanarius*, destroying the circular outline of the bullæ when viewed from the side. Teeth as in *M. avellanarius*.

Measurements.—Head and body 80 mm.; tail-vertebræ 66; hind foot 17; ear from meatus 10; ear from crown (dry) 5·8. Skull: condylo-basal length 21·2; zygomatic breadth 13; mastoid breadth 10·6; interorbital breadth 3·4; nasal (along median suture) 7; diastema 5·6; mandible 12·4; upper tooth-row (alveoli) 4·4; lower tooth-row (alveoli) 4.

Specimen examined.—The type.

Remarks.—In all respects, except for the small circular audital bullæ, this species so exactly resembles *Muscardinus avellanarius* that I can detect no other characters by which it may be recognized. While the Turkish dormouse is represented by the type specimen only, the series of skulls of the European animals is sufficient to show that the outline of the bullæ is constant enough to be of much importance in distinguishing between closely related forms.

X. — *A Survey of the Species and Varieties of Pupa, Draparnaud (Jaminia, Risso), occurring in South Africa.*
By JAMES COSMO MELVILL, M.A., F.L.S., and JOHN HENRY PONSONBY, F.Z.S.

[Plates I. & II.]

WHEN Mr. Henry C. Burnup visited England recently, we pointed out to him that several so-called species of *Pupa* appeared to be insufficiently defined, suggesting that he would, perhaps, feel inclined, on his return to S. Africa, to

give special attention to the genus. This he at once promised to do, and to him alone belongs the full credit of the survey now instituted. He has, with most infinite pains and patience, succeeded, firstly, in unravelling the majority of the difficulties arising from insufficient delineation or description, and, secondly, in weighing each form separately in the balance and judging as to its specific or varietal value.

It is not surprising that, in the careful examination of hundreds of specimens, collected from widely distant localities, his observations should have led him to take a broader view than had heretofore been possible, enabling him to correct many erroneous conclusions. He has now entrusted to us his valuable notes and drawings with full permission to use them. Indeed, without his aid this revision could not possibly have been attempted, and well has he merited, not our own thanks only, but the gratitude of every student of the South-African molluscan fauna.

1. *Pupa crawfordiana* (M. & P.).

Fauxulus crawfordianus, Melvill & Ponsonby, Ann. & Mag. Nat. Hist. ser. 7, vol. xii. (1903) p. 605, pl. xxxi. fig. 5.

A fine species, allied to *P. layardi*, Bens., with a cylindrical contour, attenuate towards the apex. It was described as a dextral *Fauxulus*, but seems better included in *Pupa* proper.

Alt. 8, lat. 3·75 mm.

Hab. Mossel Bay (*J. Crawford*).

2. *Pupa cryptoplax*, M. & P. (Pl. I. figs. 1, 2.)

Pupa cryptoplax, Melvill & Ponsonby, Ann. & Mag. Nat. Hist. ser. 7, vol. iv. (1899) p. 198, pl. iii. figs. 11, 11 a.

We give two of Mr. Burnup's drawings, taken from a juvenile and mature specimen respectively, and in these will be seen :—

(a) the deep-seated and much inwardly extending parietal plait, with

(b) a plait, occasionally duplicated, encircling the columella, and

(c) a broad, apparently transverse, labial plica; while

(d) there exists on the young shell an evident septum.

We quote Mr. Burnup's remarks *in litt.*, as follow :—

“Observing some strange-looking plaits or septa in some young shells, I made an internal examination, to see how far in the growth these were continued. Two plaits are shown

in the young through the translucent shell, and one example showed three. Two more mature specimens that I opened up exhibit none of these plicæ. Have they been absorbed as the shell grew?"

In external form and size *P. cryptoplaæ* does not appear to vary much, being always somewhat conically pyramidal or turbinate, deeply umbilicate, with whorls $7\frac{1}{2}$ to 8 in number, lip slightly elongate, oblique, reflexed, white.

Alt. 3·12, lat. 1·85 mm. (sp. min.).

„ 3·76, „ 2·15 „ (sp. maj.).

Hab. Kragga Kamma, Port Elizabeth.

3. *Pupa dadion*, Bens. (Pl. I. fig. 3.)

Pupa dadion, Benson, Ann. & Mag. Nat. Hist. ser. 3, vol. xiii. (1864) p. 495; Pfeiffer (*Pupilla*) Nomencl. Helic. Viv. (1881) p. 354; Melv. & Pons. P. Malac. Soc. vol. iii. (1898) p. 176; Sturany, Südafrik. Moll. (1898) p. 70.

This interesting species never having as yet been figured, we take pleasure in reproducing an admirable delineation of Mr. Burnup's, drawn from a specimen collected by the author, Mr. W. H. Benson, in the collection of J. H. P., the exact measurements of this specimen being, as compared with the type:—

Alt. 3·10, lat. 1·76 mm.

(Type) „ 3·50, „ 2·0

Hab. Simons Bay, behind the Admiralty House, also at Paradise, Table Mountain (*E. L. Layard*); Bedford, Cape Colony (*Ponsonby & Farquhar*); Umvoti County, Natal (*Lightfoot*).

Specimens from these last two localities confirmed and identified by Mr. H. C. Burnup.

4. *Pupa damarica*, Ancey.

Pupa damarica, Ancey, Le Naturaliste (1888), p. 200.

“Testa subcylindraceo-oblonga, sat gracilis, parva, tenuiuscula, perforata, subnitida, obliquè confertimque striatula, apicem versus levior; spira parva, attenuata, summo magno, obtusissimo. Anfr. $5\frac{1}{2}$, regulariter accrescentes, convexi, sutura profunda distinctèque obliquè separati, usque ad peristoma paulatim sed vix diametro crescentes, ultimus latere convexus, parum attenuatus, propè aperturam subascendens. Apertura ovalis, parum lunata, ferè recta, intus 5-dentata, dente uno columellari parvo acuto; parietali maximo, lamellifero, torto, intrante propè angulum superiorem aperturæ: subbasali parvo, et denticulis 2 in interiore marginis exterioris, primo antè, secundo post medium (hoc majore

et profundius sito). Perist. expansum, marginibus callo junctis, albidulum ad basin et columellam, dilatatum, patulum.

“ Long. $2\frac{1}{4}$, diam. $1\frac{1}{8}$, long. apert. $\frac{2}{3}$, lat. $\frac{1}{2}$ mm.

“ Disappointment Key, Ovampoland (Damara).

“ Cette petite espèce appartient au même groupe que les *P. rupicola*, Say, *pellucida*, Pfr., *tripunctum*, Morelet, &c.” (*C. F. Ancey*.)

The journal in which this species was described not being very accessible, we copy the particulars above. No figure has been given, nor do we know where the type is located, but some points of affinity to *P. ovampoensis* appear to exist.

5. *Pupa dysorata*, M. & P. (Pl. I. fig. 4.)

Pupa dysorata, Melvill & Ponsonby, Ann. & Mag. Nat. Hist. ser. 6, vol. xi. (1893) p. 20, pl. iii. fig. 4; emend. vol. xii. (1893) p. 111; Sturany (*dysorota*), Südafrik. Moll. (1898) p. 71.

Shell very small, oblong, smoothish, minutely obliquely striate, apex obtuse; whorls $5\frac{1}{2}$, swollen, ventricose; body-whorl short (in type), almost straight; aperture squarely ovate, lip white, slightly reflexed, columellar tooth (in the type specimen) obsolete.

Alt. 1.43, lat. 0.90 mm. (Mr. Burnup's figure).

Hab. Griqualand East.

Var. *intradentata*, Burnup, nov. (Pl. I. figs. 5, 6.)

Shell minute, rimate, subcylindrical, elliptic, thin, translucent, shining, very pale brown; spire turbinate, with greater width at the fourth whorl; sutures impressed, apex very obtuse; whorls $5\frac{1}{2}$, very convex, closely transversely striate, excepting the first $1\frac{1}{2}$, which are smooth, the last compressed round the umbilical region; aperture nearly erect, rounded, nearly $\frac{1}{3}$ the height of the shell. Peristome slightly thickened and reflexed, more so at the collumellar margin, scarcely paler than the rest of the shell, with labrum slightly straightened about the middle. Columella arcuate, the only tooth being conspicuous, white, rounded, and remote; it is situated inside, about midway between the last suture and the base, and about half a turn from the labium.

Alt. 1.47, lat. 0.79 mm. (maj.).

” 1.40, „ 0.74 „ (min.).

Hab. Pretoria (*Farquhar & Ponsonby*).

“ A pretty little shell, one of the smallest of the South-African group, and of a paler colour than usual. As compared with *perplexa*, Burnup, sp. n., which is its nearest ally,

perhaps, both having the remarkable deep-seated postlabial tooth, this species is smaller, smoother, paler, and less cylindrical, is only rimate instead of umbilicate, has the peristome less deflexed, and is destitute of the postcolumellar and parietal plaits. It would appear that *intradentata* and *dysorata* have the same general appearance; indeed, I suppose that it must be considered a toothed variety of it, and that the typical specimen of *dysorata* neglected to develop the tooth." (H. C. B.)

6. *Pupa farquhari*, M. & P. (Pl. I. fig. 7.)

Pupa farquhari, Melvill & Ponsonby, Ann. & Mag. Nat. Hist. ser. 7, vol. ii. (1898) p. 123, pl. vii. fig. 7.

We would add to our original description that the outer lip, as well as the columellar margin, is somewhat thickened within. We refigure from one of Mr. Burnup's drawings.

Alt. varies from 3.93 to 4.24 mm.

Hab. Elandsberg Mountain, Cradock (*Farquhar*).

Mr. Burnup writes to us in reference to this:—"Good species; very near to *P. dadion*, Bens., but distinguishable. I think that *dadion*, occurring so near to *farquhari*'s habitat, as well as at the extremes, Simon's Bay, and Umvoti Co., Natal, without the slightest variation, tends to support its distinctness as an inhabitant of the intermediate locality, Cradock." (H. C. B.)

7. *Pupa fontana*, Kr.

Pupa fontana, Krauss, Südafrik. Moll. p. 80, pl. v. fig. 6; Pfeiffer (*Vertigo, Alæa*), Nomencl. Helic. Viv. (1881) p. 358; Morelet, Journ. de Conch. xxxviii. p. 19; M. & P. Proc. Malac. Soc. vol. iii. (1898) p. 176; Sturany, Südafrik. Moll. (1898) p. 69.

Since we first undertook the description of South-African Mollusca, nearly twenty years ago, an immense quantity of this species has been gathered by several collectors, from widely different localities, showing extraordinary range of variation. Under *fontana*, indeed, we must now place the following:—

- (a) *amphodon*, M. & P. Ann. & Mag. Nat. Hist. ser. 6, vol. xviii. (1896) p. 317, pl. xvi. figs. 6, 7.
- (b) *charybdica*, M. & P. Ann. & Mag. Nat. Hist. ser. 6, vol. xiv. (1894) p. 94, pl. i. fig. 13.
- (c) *custodita*, M. & P. Ann. & Mag. Nat. Hist. ser. 6, vol. xiv. (1894) p. 93, pl. i. fig. 9.
- (d) *elizabethensis*, M. & P. Ann. & Mag. Nat. Hist. ser. 6, vol. ix. (1892) p. 19, pl. v. fig. 13.
- (e) *endoplax*, M. & P. Ann. & Mag. Nat. Hist. ser. 7, vol. viii. (1901) p. 319, pl. ii. fig. 10.

- (f) *frustillum*, M. & P. Ann. & Mag. Nat. Hist. ser. 6, vol. xiv. (1894) p. 94, pl. i. fig. 14.
 (g) *keræa*, M. & P. Ann. & Mag. Nat. Hist. ser. 6, vol. xiv. (1894) p. 94, pl. i. fig. 12.
 (h) *omicronaria*, M. & P. Ann. & Mag. Nat. Hist. ser. 6, vol. xiv. (1894) p. 93, pl. i. fig. 11.

Here we quote from Mr. Burnup *in litt.*:—"Judging from the number and diversity of the specimens submitted to me from so many different localities, this, the first described of the South-African *Pupæ* or *Jaminæ*, would appear to be the commonest, most variable, and most widely distributed species. Specimens now in my hands have been collected at Johannesburg (*McBean & Johnson*); Pretoria (*Ponsonby, Wotton, & McBean*); Potchefstroom and Heidelberg (*Miss Livingston*); Prieska (*Lightfoot*); Cradock (*Ponsonby & Farquhar*); Port Elizabeth (*Ponsonby, Crawford, Farquhar, Lightfoot*); Kowie (*Ponsonby*); Karkloof, Natal (*McBean*).

"Specimens also in Mr. Ponsonby's collection from Abyssinia can in no way be distinguished from those from South Africa.

"The following measurements of a few of the specimens examined will give some idea of its extreme variability, both in size and form:—

"Alt. 2·07, lat. 1·28 mm.

" 2·22, " 1·45 "

" 3·67, " 1·66 "

" 3·75, " 1·67 "

"In colour, too, it varies from the brownish horn-colour of the type, or even darker, through pale brown and straw-colour, to white, the first being the commonest, and white the next—the intermediate shades are rarer. The tooth-processes also vary, not only in development, but also in number, and it seems probable that some of the kindred forms described under different names belong properly to this species.

"The words 'anfr. supremo extus scrobiculum formante' in Krauss's original description seem erroneous: the sulcus on the outer side of the labium corresponds with the lower labial tooth or plait, not the upper, as may be inferred from Krauss's own figure." (*H. C. B.*)

With regard to the forms (originally deemed of specific rank) now necessarily merged in *fontana*, we would merely remark that:

(a) *amphodon* has the dentition, particularly the inner plaits, peculiarly strongly developed.

(b) *charybdica* possesses a much incrassate lip, and dental processes deep-seated.

(c) *custodita*, in addition to the usual columellar, parietal, and two internal labial plicæ, possesses a third labial, the uppermost of the three in situation, very deep-seated, and often obscure.

(d) *elizabethensis*. Nearly all the specimens seen by us are albino, giving a distinctive appearance.

(e) *endoplax*. This may possibly be synonymic with Jickeli's var. *globosa* (Afr. Moll. t. 5. f. 11), also mentioned in Nomencl. Hel. Viv., but we have not seen the typical specimen.

(f) *frustillum*. This form is more elongate than the type, while

(g) *keraca* is cylindrical in shape.

But we are now inclined to agree with Mr. Burnup, that these names are hardly worth while perpetuating.

8. *Pupa griqualandica*, M. & P. (Pl. I. figs. 8-10.)

Pupa griqualandica, Melvill & Ponsonby, Ann. & Mag. Nat. Hist. ser. 6, vol. xi. (1893) p. 22, pl. iii. fig. 9; Sturany, Südafrik. Moll. (1898) p. 71.

Shell very minute, umbilicate, ovato-conical; brown, whorls 5, ventricose, much compressed, uniformly, closely, longitudinally, finely striate, the body-whorl often dorsally contracted and sulcate behind the peristome; aperture oval or roundly ovate, lip thickened, with five plaits, a sixth being visible in some specimens likewise, this is probably always present, but so deep-seated in some cases as not to be observed, as it is wholly internal. These plaits are disposed as follows:—Two parietal plaits, running parallel to each other, both recurved and deeply penetrating; a third runs inwards from the labial sinus; a fourth, small in the type and co-type, large in specimens since collected, is basal and dentiform; the fifth, the columellar plait, is acinaciform, thin, and deep-seated; the sixth process, so often invisible externally, is basal and almost entirely internal.

The measurements vary as follows:—

Alt. 1.6 to 1.65, lat. 0.87 to 0.94 mm.

Hab. Cradock (*e coll. Rogers*); Port Elizabeth (*Ponsonby*); Botanic Garden, Maritzburg (*Burnup*); Heidelberg; Dargle, Natal (*Miss Livingston & Burnup*); Dukuduku, Zululand (*Toppin*); Pretoria (*Farquhar*); Griqualand (*coll. Sykes*).

We figure a few of the more conspicuously interesting forms of this wonderful and complicate shell, selected from the many excellent drawings of the species executed by Mr. Burnup, in substitution of the original figure and Latin description, both of which were insufficient in detail.

9. *Pupa haploa*, M. & P.

Pupa haploa, Melvill & Ponsonby, Ann. & Mag. Nat. Hist. ser. 6, vol. xi. (1893) p. 21, pl. iii. fig. 7; Sturany, Südafrik. Moll. (1898), p. 70.

A small simple-mouthed species, of which the type only occurred, unfortunately mislaid soon after description, fifteen years ago. No example has since come to hand. Seemingly allied to *P. pretoriensis*, M. & P.

Alt. 1.70, lat. 0.75 mm.

Hab. Pretoria.

10. *Pupa iota*, M. & P. (Pl. I. fig. 11.)

Pupa iota, Melvill & Ponsonby, Ann. & Mag. Nat. Hist. ser. 6, vol. xiv. (1894) p. 93, pl. i. fig. 10; Sturany, Südafrik. Moll. (1898) p. 70.

"Shell very small, rimate, subcylindrical, elongate, thin, translucent, shining, pale brown; spire slightly narrowing upwards, the greatest width being at the fifth and sixth whorls, sutures impressed. Apex obtuse; whorls $7\frac{1}{2}$, very convex, closely lirate transversely, excepting the first $2\frac{1}{2}$, which are smooth, the last whorl compressed round the umbilical region, and flattened near the middle of the labium; aperture straight, subangularly rounded, about $\frac{1}{4}$ the height of the shell, peristome reflexed, widely so at the columellar margin, slightly thickened, pale, untoothed, with labium somewhat incurved about the middle, columella straight.

"Alt. 2.17, lat. 0.92 mm. (maj.).

" 2.10, „ 0.88 „ (min.).

"*Hab.* Pretoria, Transvaal (*Collier, McBean, & Farquhar*); Heidelberg (*Miss Livingston*); Dukuduku Forest, Zululand (*Toppin*).

"A slender cylindrical form which seems to be quite distinct from all described species, though seemingly comparable with *P. quantula*, M. & P., which is less tapering upwards, broader in comparison to its length, and fine in sculpture, and also with *P. pentheri*, Stur., a more conical shell, with smoother sculpture, the whorls particularly ventricose, and shallower sutures." (*H. C. B.*)

The original type (from Pretoria) is slightly smaller in dimensions than those given above, and is not in very perfect condition.

Var. *livingstonei*, nov., Burnup, MS. (Pl. I. fig. 12.)

Shell very similar to the typical form, eight-whorled, cylindrical, impressed at the sutures, somewhat coarsely

longitudinally striate; aperture simple, with one internal tooth opposite to the mouth, very obscurely designated in some specimens, which are therefore intermediate between this variety and the type.

Alt. 2·02, lat. 0·84.

Hab. Pretoria (*Connolly* in coll. Burnup).

11. *Pupa layardi*, Bens. (Pl. II. fig. 13.)

Pupa layardi, Benson, Ann. & Mag. Nat. Hist., December 1856; id. *ibid.* ser. 3, vol. xiii. (1864) p. 496; Melv. & Pons. Proc. Mal. Soc. Lond. (1898) p. 177; Pfeiffer, Mon. Helic. Viv. iv. p. 674, vi. p. 318; id. (*Vertigo, Alaea*) Nomencl. p. 358.

We treat this dextral species as a *Pupa*, relegating the sinistral forms alone to the subgeneric *Fauxulus* (= *Faula*, H. & A. Ad., 1858*, præocc.).

In Mr. W. H. Benson's revised description (*l. c.* p. 496) a var. *minor* is alluded to, about which some uncertainty exists. What is *P. stoaphora*, Benson, and when described? Can this be a synonym of the var. *minor*? Neither we nor Dr. R. Sturany † can trace the species.

Alt. $5\frac{1}{2}$ –7, lat. 2–3 mm. (*Benson*).

Hab. Bredasdorp.

The figure is taken from a shell received by J. H. P. from Mr. Benson.

12. *Pupa noltei*, Bttg. (Pl. II. figs. 14, 15.)

Pupa noltei (*Microstele*), Bœttger, Ber. Senckenb. naturf. Ges. (1886) p. 26, pl. ii. figs. 4 a–c.

Hab. S. Kalahari.

We have not seen this species; the following is a copy of the original description:—

“Testa minima, punctato-rimata, cylindrato-turrita, solida, corneo-lutea, spira elongata, turrita, apex perobtusus. Anfractus 6, lentissimè accrescentes, sat convexi. Sutura profunda disjuncti, leviter obliquè striatuli, ultimus penultimo vix major, $\frac{1}{4}$ altitudinis testæ æquans, basi angulatus, versus aperturam parum ascendens, albidus, dorso distinctè planatus, et circum rimam gibbus. Apertura parva, circulari-ovalis, basi parum recedens, 4-dentata. Peristoma acutum, planè latèque expansum, album, marginibus convergentibus callo ad insertionem marginis dextri tuberculifero

* Gen. Recent Mollusca, ii. p. 171.

† Sturany, Südafrik. Moll. p. 68, giving only as reference Paetel's Catalog. Samml. ii. p. 305.

· junctis, dextro supra angulatim curvato, basali et sinistro regulariter arcuatis. Dentes 4 profundi, 1 parietalis pliciformis, columellaris 1 validus, palatales gemini, punctiformes in faucibus. "Alt. $3\frac{3}{4}$, diam. max. $1\frac{1}{2}$, alt. apert. 1, lat. 1 mm." (Boettger.)

A copy of the original figure is given.

13. *Pupa ovampoensis*, M. & P. (Pl. II. fig. 16.)

Pupa ovampoensis, Melv. & Pons. Ann. & Mag. Nat. Hist. ser. 6, vol. xi. (1893) p. 22, pl. iii. fig. 9; Sturany, Südafrik. Moll. (1898) p. 71.

Pupa ridibunda, Melv. & Pons. Ann. & Mag. Nat. Hist. ser. 7, vol. viii. (1901) p. 320, pl. ii. fig. 11.

Shell minute, rimate, thin, brown; whorls $5\frac{1}{2}$, the apical depressed, glassy, the rest very ventricose, impressed suturally, microscopically finely obliquely striate, in the more typical form almost smooth; occasionally lirate longitudinally; aperture round, lip pale brown, continuous, especially thickened at the columellar margin, furnished with the following processes: a thickened, often bifid, parietal plait; two labial (the lower one, as a rule, the larger), sometimes situated more deeply back; a prominent obtuse basal tooth; and columellar plait, broad, flat, occasionally bifid, deep-seated.

In the form *ridibunda* the parietal plait is very conspicuously bifid and the basal tooth usually acute, but every intermediate occurs.

Alt. 2·25, lat. ·97 mm. (maj.).

 " 2·3, " ·86 " (min.).

Hab. Ovampoland (*E. L. Layard*); Prieska (*Dr. Gibbons*); Port Elizabeth (*Farquhar*); Rustenberg (*McBean*), lirate variety; Potchefstroom (*Miss Livingston*); Elandsberg Mts. (*Farquhar*), "*ridibunda*."

We thank Mr. Burnup for having cleared up the distribution of this species, of which the type came from the remote Ovampoland. A variable shell in the disposition of its peristomatal processes, but to be recognized by its round continuous lip, long cylindrical form, with very ventricose whorls. *P. damarica*, Ancy, may possibly be identical; see our remarks under that species, which has never been figured.

We may add that *Bifidaria quadridentata*, Sterki, from the Capitan Mountains, U.S.A., and a Mauritius species very doubtfully referred to *P. lienardiana*, Crosse, on the authority of Dr. Penther, come near our species, though both differ slightly in form and in disposition of dental arrangement.

14. *Pupa pentheri*, Stur.

Pupa pentheri, R. Sturany, Anz. k. Akad. Wissensch. Wien, 1898, no. xvi. Rep. p. 8; id. Catal. Südafrik. Moll. 1898, p. 70, Taf. ii. figs. 34-36.

A very minute, elongate-cylindrical, seven-whorled species, with simple mouth, containing no processes whatsoever. An extension of its range has been made by Mr. Toppin's discovery of its existence at Dukuduku, Zululand.

Alt. 1·85, lat. 0·78 mm. (maj.).

15. *Pupa perplexa*, Burnup, sp. n. (Pl. II. figs. 17, 18.)

Shell very small, umbilicate, cylindrical, thin, translucent, shining, pale brown; spire cylindrical, rounded above, sutures impressed, apex obtuse; whorls 6, very convex, closely transversely lirate excepting the first two, which are smooth, the fourth, fifth, and sixth of nearly equal width, the last half-whorl acquiring its greatest width a little below the suture and then being flattened below, forming an infra-sutural angle, the last whorl compressed towards the umbilicus; aperture rounded, nearly $\frac{1}{3}$ the height of the shell; peristome reflexed, especially at the columellar margin, thickened, connected by a slight callus, whitish, furnished with a small white parietal plait running inwards, and there becoming strong, and a strong white postcolumellar plait also running inwards, in addition to which there is a profoundly postlabial tooth or plait hidden by the columella; labium slightly incurved about the middle; columella straight.

Alt. 1·72, lat. 0·82 mm.

„ 1·74, „ 0·80 „

„ 1·80, „ 0·77 „

Hab. Cradock, Cape Colony (*Farquhar*); Johannesburg, Transvaal (*McBean*); Pretoria (*Collier & Ponsonby*); Port Elizabeth (*Farquhar*); Potchefstroom (*Miss Livingston*).

A very pretty and interesting little species, much like *iota*, M. & P., in colour, sculpture, and ventricosity of whorls, but differing in being shorter, more cylindrical, and umbilicate instead of rimate, and in having a more thickened and reflexed peristome, fewer whorls, and an armature of tooth-processes of which the other is, *typically*, destitute.

The arrangement of the peristomatal and other processes in this species is very elusive, some examples viewed from the front showing no plaits, others one, some two, and a few all three; but in most specimens they can all be seen under a strong lens by turning the shell round. Such specimens

as show in a front view only the columellar plait, or only the postlabial tooth, are easily confused with *P. intradentata*, Burnup, which, however, is more abbreviate, with rounder aperture and finer sculpture.

16. *Pupa pretoriensis*, M. & P.

Pupa pretoriensis, Melv. & Pons. Ann. & Mag. Nat. Hist. ser. 6, vol. xi. (1893) p. 21, pl. iii. fig. 8; Sturany, Südafrik. Moll. p. 71.

A minute simple-mouthed species, with particularly broad apex, much flattened.

Hab. Pretoria, Transvaal.

17. *Pupa psichion*, M. & P.

Pupa psichion, Melv. & Pons. Ann. & Mag. Nat. Hist. ser. 6, vol. xiv. (1894) p. 93, pl. i. fig. 8; Sturany, Südafrik. Moll. p. 70.

Slightly more ventricose than the last, which it resembles in its simple month, untrammelled by any processes whatsoever. The types of both these species are, unfortunately, no longer in existence, having been accidentally broken.

Hab. Pretoria, Transvaal.

18. *Pupa quantula*, M. & P. (Pl. II. fig. 19.)

Pupa quantula, Melv. & Pons. Ann. & Mag. Nat. Hist. ser. 6, vol. xi. (1893) p. 20, pl. iii. fig. 5; Sturany, Südafrik. Moll. p. 70 (1893).

Hab. Port Elizabeth.

Evidently a rare species. We refigure it from a drawing by Mr. Burnup of a co-type, which gives a better representation than did the original figure. The measurements of this specimen are:—

Alt. 1·87 mm.; lat. 4th, 5th, and 6th whorls 0·84, 6th whorl to labium 0·91.

19. *Pupa sykesii*, M. & P.

(Pl. II. fig. 20; var. *inconspicua*, fig. 21.)

Pupa sykesii, Melv. & Pons. Ann. & Mag. Nat. Hist. ser. 6, vol. xi. (1893) p. 21, pl. iii. fig. 6, vol. xii. (1893) p. 111; Sturany, Südafrik. Moll. p. 70.

Pupa inconspicua, Burnup, M.S.

Hab. Griqualand East (*e coll. Sykes*).

We refigure this species, the original description and representation being faulty. The "teeth of the peristome, which with difficulty are distinguished," are found not to have any real existence, the mouth of the type having been clogged with certain foreign particles.

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There can be no doubt that this is identical with a form of which Mr. Burnup had drawn up a description under the name *inconspicua*, and we take leave to introduce it here, as being more accurate and exhaustive than the original:—

“Shell very small, rimate, subeylindrical, elongate-oval, very thin, subhyaline, shining, brown; spire slightly convexly narrowing upward above the fifth whorl, sutures impressed, apex obtuse; whorls $7\frac{1}{2}$, convex, nearly smooth, faintly striate, with very fine microscopic, irregular, transverse cuticles, becoming stronger towards the base, last whorl not much impressed around the umbilical region; aperture slightly oblique, rounded, nearly $\frac{1}{4}$ of the altitude of the shell; peristome reflexed, especially at the columellar margin, slightly thickened, connected by a thin callus, pale, untoothed, straightened near the middle of the labrum; columella arcuate.

“Alt. 2·05, lat. 0·72 mm. (maj.).

” 1·94, ” 0·77 ” (min.).

“*Hab.* Dargle, Natal (*Miss Livingston*); Grahamstown, Cape Colony (*Farquhar*).

“A very delicate, minute, and rather characterless shell, long and narrow, but varying a good deal in size and proportions of height to width. It is so thin and transparent that in a side light the whole range of the columella can be viewed.

“Its nearest ally among South-African shells appears to be *P. pentheri*, Sturany, whose sculpture is very similar, but in form quite distinct, more conical, and with flatter whorls and shallower sutures. The rima or umbilical slit is, moreover, deeper.

“It is also comparable with *P. livingstonæ* (*iota*), much resembling it in form, though it narrows above more gradually. But the comparatively coarser sculpture and more angular aperture readily distinguish it.” (*H. C. B.*)

20. *Pupa tabularis*, M. & P. (Pl. II. fig. 22.)

Pupa tabularis, Melv. & Pons. Ann. & Mag. Nat. Hist. ser. 6, vol. xi. (1893) p. 20, pl. iii. fig. 3.

A new figure is very necessary, the conspicuous parietal tooth not having been done justice to. A certain bulimoid resemblance exists in the character of the whitish reflexed peristome. *P. dadion*, Bens., is its nearest ally.

Alt. 3·93 mm. (maj.).

” 3·4 ” (min.).

Hab. Near Cape Town (*R. M. Lightfoot*).

§ VERTIGO, Müll.

21. *Pupa (Vertigo) sinistrorsa*, Crav. (Pl. II. fig. 26.)

Pupa (Vertigo) sinistrorsa, A. E. Craven, Proc. Zool. Soc. 1880, p. 618, pl. lvii. fig. 8.

Vertigo thaumasta, Melv. & Pons. Ann. & Mag. Nat. Hist. ser. 6, vol. viii. (1891) p. 239, vol. ix. (1892) p. 94, pl. vi. fig. 7; Sturany, Südafrik. Moll. p. 68.

Alt. 3, lat. $1\frac{1}{2}$ mm.

Hab. Algoa Bay, &c. ; widely distributed.

We consider *thaumasta* and *sinistrorsa* identical, though they are still left separate by Dr. Sturany (*l. c.* p. 68), who also mentions Dr. Penther having collected a form distinct from either of these in its tooth-processes, but concerning which we know no more at present.

§§ FAUXULUS, Schaufuss.

22. *Pupa (Fauxulus) capensis* (Kurr).

Pupa capensis, Kurr, Küster, Conch.-Cab. p. 10, pl. i. figs. 19, 20.

Var. *kurri* (Krauss).

Pupa ovularis, Kurr, Küster, Conch.-Cab. p. 10, pl. i. figs. 16-18.

Var. *pottebergensis* (Krauss).

Pupa pottebergensis, Krauss, Küster, Conch.-Cab. p. 17, pl. ii. figs. 20-22.

Hab. Cape Colony.

23. *Pupa (Fauxulus) fryana* (Bens.).

Pupa fryana, Benson, Ann. & Mag. Nat. Hist. ser. 3, vol. xiii. (1864) p. 495.

Evidently a *Fauxulus*, being *sinistrorse*. Discovered at Bredasdorp, at the southern shore of Swellendam, by Mr. John Fry. Mr. W. H. Benson lays stress upon the deep umbilicus, extending to the summit. We regret not having been able to figure this species.

24. *Pupa (Fauxulus) glanvilleana* (Ancey).

(Pl. II. fig. 23.)

Pupa glanvilleana, Ancey, Le Naturaliste, 1888, p. 200.

Hab. Cape Colony.

We append a figure of this hitherto unfigured species, with a copy of the original description :—

“*T. ovato-subconioidea*, longe rimata sed imperforata, tenuis, nitidula, albida, pellucida, sinistrorsa. Spira conoideo-subventricosa, ambitu convexa, ad summum parvum obtusiuscula et levigata. Anfr. $8\frac{1}{4}$ – $8\frac{1}{2}$, regulariter et paulatim lenteque crescentes, vix convexiusculi, sutura simplice haud profunda separati, oblique arcuatim regulariterque striati, ultimus major convexus, attenuatus, antice circa umbilici locum compresso-carinatus, striis in medio anfractus subito abruptis, infra tamen perspicuis, spatio mediano angulum exilem mentienti. Apert. recta irregularis, valde ringens, superne ascendens, subrhombica, albida, lamellis obstructa et fere clausa, scilicet—parietali 1 intranti valida: palatalibus 4, supera magna prope angulum superum, obliqua et a cæteris lobo intus quasi tubulato, extus prominente separata: 2 et 3 subæqualibus, infera valida contorta; columellaribus 3 validis subæquidistantibus. Perist. incrassato-subexpansum, lamellis marginem attingentibus, margine externo superne lobulato, postea fere recto, et ante basin leviter angulato, deinde iterum recto, basali valde angulato, columellari longo, plane recto: margines callo parietali appresso continui.

“Long. 4, diam. 2, alt. apert. $1\frac{1}{2}$ mill.

“East London (District oriental de la colonie du Cap, près de la Cafrerie anglaise).

“Cette espèce, si curieuse par la forme toute particulière de son ouverture extrêmement grimaçante et resserrée par de nombreux plis, ne peut être comparée à aucune autre espèce du Cap. L’espèce la plus voisine paraît être la *P. fryana*, Bens.

“La diagnose ci-dessus, où je me suis efforcé de mentionner toutes les particularités de ce joli *Pupa*, me paraît suffisante pour la connaissance de cette espèce, dédiée à Miss M. Glanville.” (*C. F. Ancey*.)

25. *Pupa (Fauxulus) mcbeaniana* (M. & P.).

Fauxulus (Anisoloma) mcbeanianus, Melv. & Pons. Ann. & Mag. Nat. Hist. ser. 7, vol. viii. (1901) p. 319, pl. ii. fig. 9.

Hab. Karkloof Bush, near Pietermaritzburg, Natal (*J. McBean*).

26. *Pupa (Fauxulus) pamphorodon*, Bens.
(Pl. II. fig. 24.)

Pupa pamphorodon, W. H. Benson, Ann. & Mag. Nat. Hist. ser. 3, vol. xiii. (1864) p. 495.

Hab. Near Simonstown (*E. L. Layard*).

Through the kindness of Mr. Edgar Smith we are enabled to give a figure of this species from a specimen in the Nat. Hist. Museum.

27. *Pupa (Fauxulus) perevimia* (M. & P.).
(Pl. II. fig. 25.)

Pupa (Faula) perevimia, Melv. & Pons. Ann. & Mag. Nat. Hist. ser. 6, vol. xix. (1897) p. 638, pl. xvii. fig. 3.

Hab. Buffalo River.

A beautiful species, of the same character as *P. glanvilleana* (Ancey), but larger in all its parts.

28. *Pupa (Fauxulus) ponsonbyana*, Morelet.

Pupa ponsonbyana, Morelet, Journ. de Conch. vol. xxxvii. (1889) p. 9, pl. i. fig. 5.

Hab. Port Elizabeth &c. A species of very wide distribution.

This is apparently the type of Ancey's section *Anisoloma* *.

We may add, in conclusion, that we concur with Dr. H. A. Pilsbry (Man. Conch. ser. 2, vol. xviii. p. 336) in removing what he rightly terms the monotypic genus *Cœlixaxis* (sp. *C. leyardi*, Ad. & Ang. P. Z. S. 1865, p. 54, pl. ii. fig. 1: *Hab.* Cape Colony) to a place among the Achatinidæ, subfam. Cœlixaxinæ, in company with the little-known genera *Cryptelasmus*, Pilsb., from Trinidad, *Thomea*, Gir., and *Pyrgina*, Greef, from I. St. Thomé, and likewise the Lower Eocene genus *Distæchia*, Crosse, from the Paris basin.

EXPLANATION OF THE PLATES.

PLATE I.

- Figs. 1, 2. *Pupa cryptoplar*, M. & P.
Fig. 3. — *dadion*, Bens.
Fig. 4. — *dysorata*, M. & P.
Figs. 5, 6. — —, var. *intradentata*, Burnup, nov.
Fig. 7. — *farquhari*, M. & P.
Figs. 8-10. — *griqualandica*, M. & P.
Fig. 11. — *iota*, M. & P.
Fig. 12. — —, var. *livingstone*, Burnup, nov.

* *Ibid* Journ. de Conch. vol. xlix. (1901) p. 141.

PLATE II.

- Fig. 13. *Pupa layardi*, Bens.
 Figs. 14, 15. — *nottei*, Bttg.
 Fig. 16. — *ovampoensis*, M. & P.
 Figs. 17, 18. — *perplexa*, Burnup, sp. n.
 Fig. 19. — *quantula*, M. & P.
 Fig. 20. — *sykesii*, M. & P.
 Fig. 21. — —, var. *inconspicua*, Burnup, nov.
 Fig. 22. — *tabularis*, M. & P.
 Fig. 23. — (*Fauxulus*) *glanvilleana*, Anc.
 Fig. 24. — (—) *pamphorodon*, Bens.
 Fig. 25. — (—) *pereximia*, M. & P.
 Fig. 26. — (*Vertigo*) *sinistrorsa*, Crav.

XI.—*New Deep-sea Fishes from the South-west Coast of Ireland.* By E. W. L. HOLT and L. W. BYRNE.

[Plate III.]

THE fishes described below were taken by Messrs. Farran and Kemp in the course of fishery investigations carried out in the 'Helga' on behalf of the Fisheries Branch of the Department of Agriculture and Technical Instruction for Ireland. All occurred in depths of less than 1000 fathoms and, consequently, within the British and Irish marine area.

Gadidæ.

Genus *LÆMONEMA*, Günther.

The definition of this genus appears to require revision and should read as follows:—

"Body of moderate length, covered with small scales. Fins scaleless, their bases sometimes clothed with loose skin. Two dorsal fins and one anal, anterior dorsal with 5 or 6 rays. Caudal separated by a short interval from posterior dorsal and anal. Ventrals apparently reduced to a single long ray, bifid at its extremity; other rays, if present, minute and closely apposed to the large ray. Bands of villiform teeth in jaws; a small group of vomerine teeth usually present. Chin usually with a small barbel."

Læmonema seems, as Günther (1887) has remarked, to scarcely deserve generic separation from *Phycis*. The most obvious distinction lies in the first dorsal fin, which in *Phycis* has 8-12 rays and in *Læmonema* 5 or 6. The presence or absence of a barbel has no necessary generic value in Gadidæ;